

TECHNOLOGY APPLIED

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Event Recorder

DEVELOPED under contract to the Building Research Station, a digital logging device is now being marketed by the designers, Deakin Phillips Electronics Ltd., for the economical logging of events from a number of sources. The information record of each source identifies the event by its allotted channel number, together with the duration of its "on" time, the instant in real time at which it occurs and its sequence of occurrence in relation to the other sources being recorded.

The device described has a maximum channel capacity of 127 sources and records the start and finish of an event as two identifiable signals on a punched tape. A time marker is also punched on the tape so that when read through suitable measuring equipment, the duration of the event, and the identification of the source, can both be reconstituted.

The source of the event is coded in simple binary numbers and to distinguish between its start and finish, the appropriate binary code has an extra hole punched in a unique position to identify the "finish" event. The time record is designed to punch a further unique code and in the equipment supplied to the Building Research Station, an interval of 15sec is used, although other time intervals can be arranged. Although the system described is designed for recording events in relation to time, it will be appreciated that any parameters can be recorded with respect to one another, allowing correlation records to be made.

To eliminate the possible loss of record which may arise when the start or stop of an event occurs during the interval in which the time marker is being punched, an arrangement of interlocking buffer stores is used in the system. These stores also ensure that there is no complementary loss of time record when an event start or finish is being punched.

The format of a typical sequence of events being recorded is shown in Fig. 1, together with the corresponding record produced on the punched tape using a 8-hole coded system (Fig. 2). It will be seen that the storage of data by such means is economical due to the fact that the system is energized only when information is actually being recorded. There is therefore no recording of redundant information.

The Building Research Station application is concerned with collecting factual data on the pattern of domestic water usage in a local authority block of flats.

The principal intention is to determine the peak usage periods for the various water outlets separately and all together. This derived data will provide a real basis for the design of water supply and drainage systems in place of the assumptions on which design is commonly based.

FORMAT OF PUNCHED RECORD

Typical series of events shown with respect to internal time marker

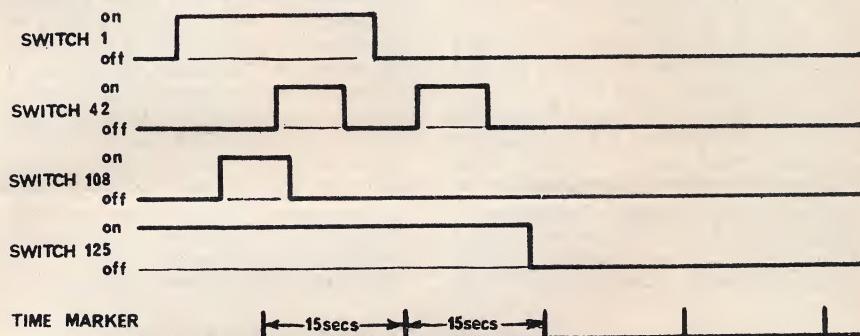


Fig. 1.

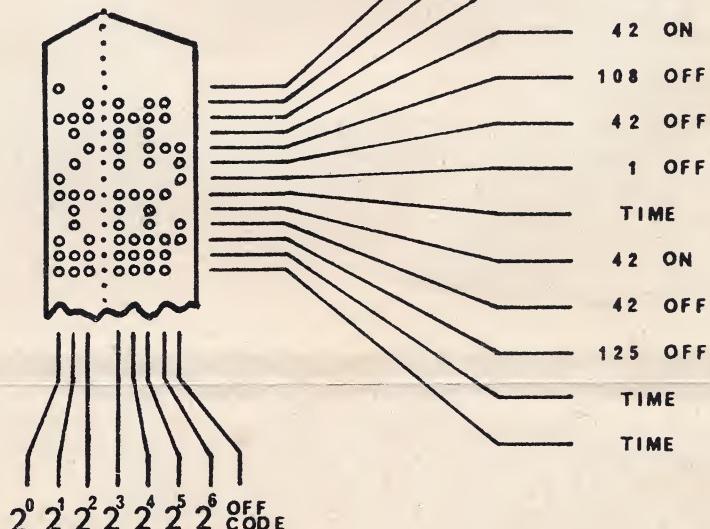
In the past the use of manual or electro-magnetic systems for recording data has been cumbersome and time consuming both in regard to recording events and the manner in which these were presented for analysis. In its present form the recording system is fully automatic, is designed to run unattended for considerable periods of time, is economical in its presentation of data, and presents the information in a form suitable for further processing by computer.

In its practical application, signals from the water outlets are developed by float

operated reed switches. These are connected to a number of the standard domestic water outlets in a series of apartments on several floor levels, and when a tap or cistern is operated, a pair of contacts in the switch is actuated. This event, which is of a transient nature, causes a signal to drive the logger via its encoding circuitry and a punched output identifying its source appears on the tape. To minimize the adverse effects of electrical noise and extraneous signals on the connecting leads between the taps and the logging equipment, integrating circuits are connected at the

Fig. 2.

PUNCHED RECORD



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Event Recorder (cont.)

input of each channel, having time constants long enough to eliminate most common sources of likely interference.

The capacity of the system is limited only by the width, in holes, of the punched tape. In view of the fact that one of the hole channels is allocated to identifying the "off" signal, the maximum channel capacity of an 8-hole tape is $(2^7 - 1)$ i.e. 127 channels. Since one of these channels is used for the time record the total number of sources which can be recorded on an 8-hole tape is 126 without ambiguity. In the Building Research Station application, a greater number of channels was required and so the system was duplicated and the records produced are distinguished by the

use of a different timing code on each.

Mathematical analysis of the system shows that the probability of the time coincidence of two or more events is less than 0.00025, and system errors therefore are negligible. As a further measure of protection it is fairly evident that where two or more events do occur simultaneously resulting in the loss of start or finish signals, analysis of the subsequent record will soon reveal the missing information.

In its practical form the logger contains solid state plug-in circuitry throughout. The equipment, which is mains operated, is designed for unattended operation for indefinite periods of time.

Standard versions of this equipment are

now being manufactured and marketed by the company as rack mounted systems, in capacity groupings of five channels up to a maximum of 125 channels in any one 19in. width module. A second 19in. module is supplied, having power supplies, encoding circuitry and interlocking control elements. System complexes can be built to meet any number of channels required using the standard elements described.

Elements of the system are also available as individual items; the printed circuit cards accommodating circuits for five channels measure approximately 6in. \times 11in. and are being marketed separately, each with its associated 24 way printed circuit connector.

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29th June, 1966

Dear Sirs,

We have been advised of your interest in the Digital Event Recorder which we have developed and have pleasure in enclosing a more complete technical description of the equipment herewith.

As a new aid to the collection of data, this economical event logger has a large number of applications. Some examples are listed below:-

- Multi-item mass production output-versus-time histogram
- Telephone and other communication line utilisation
- Production machine utilisation
- Office equipment utilisation
- Time and motion study
- Fault logging
- Automatic switching sequence monitoring
- Ship and aircraft control circuit monitoring
- Off-limit signal monitoring on test rigs
- Traffic recording system
- Correlation of physical, chemical, mechanical and electrical parameters
- Statistical analysis of event sequences and overlapping demands.
- Supply voltage and frequency fluctuation recording
- Life testing programming and recording
- Preparation of punched tape for duty cycle and sequence control of manufacturing equipment, test rigs, etc.

The recording systems we are currently manufacturing are based on a rack mounted design and for any one punch, the maximum data handling capacity is 125 channels. You will see from the enclosed description that we are also prepared to supply individual plug-in circuit boards catering for groups of 5 channels to enable customers to construct their own systems. We also offer an advisory and design and construction service and will be happy to discuss any applications you may currently be considering with a view to engineering them for you.

We will be grateful if you will let us have details of any application you may have in mind to enable us to submit our proposals and quotation without any obligation on your behalf. We look forward to hearing from you accordingly and assure you of our full co-operation.

Yours faithfully,



T. Deakin

DEAKIN PHILLIPS ELECTRONICS LTD